



## **Supply Delivery, and Installation of an Alternative Power Solution, with a 12- month Maintenance Plan at the Agricultural Research Council – NRE, Cedara Research Station**

### **TECHNICAL SPECIFICATIONS**

#### **Goal**

Supply and Installation of a 5 kWp Grid-Tied Solar PV System with 5kWh Lithium-ion batteries at ARC-NRE, Cedara Research Station (The project includes the actual design of the solar PV system as per the guidelines in the specifications below)

#### **Solar panels and Hybrid Inverters**

- Supply and install 500Watt Monocrystalline solar PV modules x 10, to yield a maximum power output of 5-kilowatt Peak(kW<sub>p</sub>).
- The inverter must be listed on the approved Photovoltaic (PV) Inverter List to ensure compliance in terms of NRS 097-2-1.
- The solar panel modules will be mounted on roofing.
- Solar modules: Jinko Solar, Canadian Solar, JA solar, RenewSys, Trinasolar , SunPro, Risen ,Haitai Solar, Astroenergy or **Equivalent**
- Solar PV modules must comply with the SANS/ IEC standards. Compliance of solar modules to the following standards is mandatory:
  - ISO9001:2015: Quality Management System
  - ISO14001:2015: Environment Management System
  - ISO45001:2018: Occupational health and safety management systems
- Supply and install a Sunsynk/Deye or equivalent 5kW single-phase hybrid inverter to match a 5 kW<sub>p</sub> from the solar PV array. See inverter specifications below:
  - Max. DC Input Power (W) of the hybrid inverter = 6500W
  - Max. AC Output Power = 5500W
  - Install DC isolators, fuses and Surge protection devices.
  - Supply all the solar panels and battery wiring, and all sundries items.
  - Inverter must include communication with BMS.
- Supply communication cables for Inverters & Batteries.

## Batteries

- Supply and install a lithium-ion battery of 5 kWh. **Sunsynk or equivalent**
- Must allow at least 1 parallel connection for scalability of energy storage.
- Dischargeable at 80% Depth of Discharge (DoD).
- Performance cycle life  $\geq 6000$  cycles.
- Safe and secure with thermal management features.
- Battery management system.
- Installation Type: **Floor Stand or Wall Mounted** (To be finalised with end-user).
- Supply battery rack/cabinet for support of batteries, where applicable.
- Ensure the battery model is compatible with the inverter.

## Lightning Protection and Earthing for Solar PV

Apply measures to prevent catastrophic damages and failures of the installed PV system due to lightning. South Africa is in a highly lightning-dense region when compared to the rest of the world. Therefore, lightning strikes can still pose a risk to any electrical system, including solar panels, **installing lightning protection specific to the installed solar PV system.** Proper grounding, surge protection, and adherence to safety guidelines are crucial to minimizing the potential damage caused by lightning strikes. Grounding involves connecting solar panels, inverters, and other electrical components to the Earth's surface, creating a path for electrical currents to safely dissipate into the ground. **Use earthing, electrical configurations, and protection products based on standard compliance and protection.**

## Hail protection for solar panels.

To ensure durability against hail, the solar PV system must incorporate hail-resistant panels, preferably rated to withstand impact from hailstones up to 25 mm in diameter at 80 km/h, as per IEC 61215 standards. The mounting system should be designed with an adequate tilt angle and robust materials to prevent damage from hail impact.

## Application for management

The solar PV system must include a user-friendly mobile and desktop application for monitoring and managing system performance. This app should provide real-time data on energy generation, battery status, and grid interaction, allowing users to track energy usage, savings, and system health. It should feature intuitive dashboards, alert notifications for system faults, and customizable settings to optimize energy consumption. The app must be compatible with Android, iOS, and web platforms, and allow remote access to ensure easy

monitoring and control of the system, enhancing user engagement and system management efficiency.

The system provider must offer comprehensive training on how to effectively use mobile and desktop applications for monitoring and managing the solar PV system. This training should cover all key functionalities, including tracking energy generation, battery performance, and system health, as well as setting alerts and optimizing energy usage. Additionally, the provider should offer ongoing support for at least 12 months post-installation, ensuring users have access to assistance in case of any technical issues or questions regarding the app or system operation. This support will help ensure smooth adoption and optimal use of the system.

### **Commissioning**

- Installation must have been performed under the supervision of a qualified electrician according to the approved design.
- The qualified installer/electrician must be a registered electrical contractor and provide certification prior to installation.
- The electrician must sign and provide a certificate of compliance (COC) for the installation (inverter and panels).
- As part of a hand over, system design, as-built drawings and line diagram must be submitted to ARC.

### **Warranty**

All equipment (Inverters, solar panels, batteries, etc) installed must have a manufacturer's warranty. The service provider shall provide a 12-month guarantee on the workmanship of the work undertaken at no cost to the ARC. If during this period the equipment is not in good working order, or not working satisfactorily owing to faulty material, design, or workmanship, the service provider will be notified and immediate steps must be taken by the service provider to rectify the defects and/or replace the affected parts on-site, at no cost to ARC.

Inverters and batteries must be installed by a qualified electrical wireman (Proof of qualification to be provided with proposal) or Master electrician with a valid registration with the Department of Labour. A valid electrical certificate of compliance must be issued once installed, specific to the installation of the backup solar system. The installation must be compliant with SANS 10142 and all its parts. The installation must comply with all warranty claim processes specific

to each brand of equipment. The service provider must hand over all documents related to warranties.

#### Warranties Periods:

- Inverter 5-Year warranty
- Solar modules: 12 Year product warranty and 25 Years linear power performance Warranty
- Batteries 10-year warranty

#### Security

Use tamper-resistant hardware for mounting solar panels, to make it difficult for thieves to remove them.

#### Experience

Qualified service providers are required; however, experience is of equal importance. Service providers must submit three reference letters or a list of completed projects of similar size (grid-tied systems with a minimum capacity of 5 kW), together with traceable contact details of at least three past clients.

#### Miscellaneous

All preliminary work must be discussed with ARC personnel before construction begins. Any downtime when connecting new solar power to the existing grid should be communicated with the point of contact (Dr Alanna Rebelo) at least 24 hours in advance.

#### Distribution Box Installation

The critical loads to be powered are **desktop computers, laptops, servers, LED lights, and fridge**. These electrical loads are currently tapping power from a nearby room in another department which normally gets locked and when supply circuit breakers get tripped, the water science unit is disconnected from the power supply. Therefore, this solar project includes installing a new distribution box wired to the mains electricity. The solar system must be grid-tied to this new DB box. In addition, there are a few old wires and electrics in the office that would need to be removed as part of this project. The scope of the work must include disconnecting the water science unit from next-door room's power supply DB and removing/cleaning up the wiring in the Water Science Unit office.

In addition to the new DB Box requested for all electrical loads, a DB Box for solar only electrical loads must be installed.

### **Place of installation**

Delivery to Water Science Unit, NRE, Cedara Research Station, KwaZulu-Natal,

Coordinates: -29.541390233818206, 30.267373642766533

<https://maps.app.goo.gl/NjGT4GYZrvi964s5>

### **Contingency Provision**

A **contingency amount equal to 10%** of the quoted price must be included. This reserve will be held by the Agricultural Research Council (ARC) to address any unforeseen circumstances. The use of this amount will be subject to prior written agreement between ARC and the appointed Contractor/Service Provider.

### **Compulsory Requirements**

#### **CIDB Grading**

Bidders must be registered with the Construction Industry Development Board (CIDB) and hold a minimum grading of **1EP or higher**.

#### **Relevant Experience**

Qualified service providers are required; however, experience is of equal importance. Service providers must submit three reference letters or a list of completed projects of similar size (grid-tied systems with a minimum capacity of 5 kW), together with traceable contact details of at least three past clients.

**A letter which covers both Warranty and workmanship guarantees** must be submitted together with all the bidding documents. The letter must be written in Company's letterhead.

#### **Data sheets**

Datasheets of solar modules, inverter, and batteries. NOTE: Data sheets must be original documents from the manufacturers (Not product information copied from internet and pasted to a word document). Please ensure high quality documents for readability with all technical specifications visible.

#### **Compulsory Site Briefings**

Attendance of a site briefings is **mandatory** for all prospective bidders.

- Date: 12 September 2025
- Venue: **Agricultural Research Council-NRE, Cedara Research Station, Cedara KZN, 3245**
- Time: **11:00**